We have built a novel device that uses a collar (gripping the thigh musculature where it narrows at the knee) to anchor a frame extending to a base plate distal to the foot. A screw mechanism between this plate and a harness around the foot applies force across the ankle. A purpose-built plastic gauge in the load train assures consistent tension of approximately 125N across the ankle, avoiding the risk of nerve damage (Fig. 1).

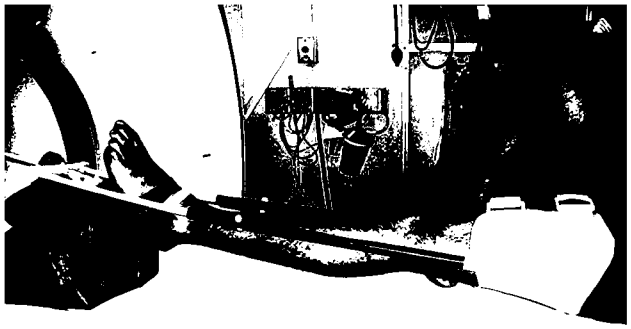

Fig. 1. Patient leg with distractor in place prior to CT imaging.

The parts of the distractor in the region of the ankle are radiolucent, and the entire device is compatible with the MR and CT environments. The distractor is adjustable for patient size and causes only minimal patient discomfort.
MR scans of the distracted ankle are performed with the device positioned within the transmit/receive extremity coil. Distraction greatly improves the quality of MR scans, allowing the observer to distinguish each bone's cartilage from the other's, thereby improving the accuracy of both dimensional measurements and of T2 and T1-rho assessments of cartilage water and proteoglycan content (Fig. 2).

Fig. 2. Coronal plane MR images showing distraction of the ankle miter to define the tibial and talar cartilage surfaces.

For CT scans, the device is used first in the fluoroscopy room for the double contrast injection; this is particularly important when the injection procedure is complicated by fibrosis, minimal joint space, and/or the presence of osteophytes characteristic of osteoarthritis. The patient is then transferred to CT where the distracted ankle is imaged.
Distraction of the ankle joint separates the cartilage surfaces of the tibia and talus, allowing not only improved clinical analysis, but also images that can be accurately segmented to create finite element models for the study of contact stress distributions. Such models are invaluable in the study of the biomechanical causes of osteoarthritis.

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GAIT BIOMECHANICS IN AN OBESE POPULATION BEFORE AND AFTER GASTRIC BYPASS SURGERY

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Aim of study: Obesity is a risk factor for the development of knee osteoarthritis (OA). Gait biomechanics change with knee pain, knee OA and obesity. We performed gait biomechanics to assess the effect of weight and weight loss on subjects before and after gastric bypass surgery (GBS).
Methods: Thirty-five subjects $\geq$ 35 years old, recruited from a GBS program completed a pre-op walk. To date, 10 subjects completed post-op walks; their data are presented. Pre-op and at 12-18 month follow-up they had weight-bearing, semi-flexed AP knee and full limb length radiographs to measure angulation. Seven of the 10 had knee pain by WOMAC scale (none at the time of walking); one leg was designated as involved (painful, or dominant, side). Spatial-temporal, kinematic and kinetic data were collected during unassisted natural cadence gait with a 7-camera Vicon 370E system. Subjects were compared before and after (paired t-tests) and to controls (Student t-test). Multivariate linear regression analysis with step-wise addition of independent variables was used with WOMAC pain and the knee adduction moment (KAM) as outcome variables.
Results: There were 9 women and 1man. Mean age 51 $\pm$ 8 years. Mean pre-op BMI was 47.3$\pm$ 7, and post-op 29.9$\pm$ 5.4 kg/m^2; mean weight loss 46.2 $\pm$ 23 kg. WOMAC pain scores before were 184.6$\pm$105 and after 59.1$\pm$ 59. Of 20 knees, 5 were K-L grade 0; 6 grade II, 4 grade III; 3 grade IV. Limb alignment for 10 knees was; 1 neutral; 5 varus; 4 valgus. Post-op, alignment improved in 7 knees. See Table. Compared to controls, obese subjects had limited knee flexion during stance and swing phase and less ankle flexion during push off. The KAM did not differ from normal and did not decrease with weight loss. Weight loss was associated with a shortened stance phase, and a trend to improved knee ROM and peak ankle forces during push off, but these remained abnormal compared to the control group despite significant improvement in pain. In regression analysis, WOMAC pain was influenced by joint space narrowing, K-L grade, osteophytes, and ankle ROM and forces. KAM was affected by ankle flexion

Abstract P279 – Table 1. Gait kinematics and kinetics

	Involved Pre	Uninvolved Pre	Involved Post	Uninvolved Post	Control
Vel. m/s	1.15 (0.11)	1.15 (0.11)	1.19 (0.13)	1.19 (0.13)	1.33**
Stance	64.5 (1.6)++	64.6 (1.3)++	62 (1.01)	61.97 (1.64)	60**
Peak knee ° flex stance	-0.12 (7.3)	-1.43 (7.9)	2.75 (5.70)	0.25 (5.46)	7.7 (4.9)**
Peak knee ° flex sw	45.7 (7.68)+	47.9 (9.8)	52.5 (5)	52.3 (3.83)	64.9 (5.41)***
Ank PF ° push off	-11.8 (5)	-10.3 (6.8)	-12.7 (6.9)	-13.7 (5.6)	-19.5 (5.8)
KAM	0.48 (0.14)	0.49 (0.23)	0.52 (0.15)	0.54 (0.25)	0.39 (0.1)
Ank DF W/kg	-0.64 (0.21)	-0.54 (0.23)	-0.59 (0.3)	-0.52 (0.38)	-0.44 (0.34)
Ank PF W/kg	1.87 (0.83)	1.74 (0.78)	2.20 (0.84)	2.37 (0.64)	3.3 (1.02)+

+$p < 0.05$; ++$p < 0.01$ paired tests. **$p < 0.01$; $p < 0.001$ control compared to involved post.

and K-L grade. Alignment did not factor in, but these patients had very mild varus or valgus changes.
Conclusions: Weight loss was associated with improvement in pain, velocity, knee ROM, shortened stance phase and a trend to improved ankle kinetics and knee alignment, but this did not impact on the KAM which was similar at baseline to controls. Additional post-op studies will help distinguish the relative roles of weight, pain, OA and alignment on gait. The improvement in gait biomechanics seen with weight loss offers potential for limitation of pain and disease progression.

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A COMPARISON OF TWO DIFFERENT EXERCISES ON THE WEIGHT LOSS IN THE TREATMENT OF KNEE OSTEOARTHRITIS: PILATES EXERCISES VERSUS CLINICAL-BASED PHYSICAL THERAPY

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Aims of Study: The purpose of this study was to determine the effect of weight loss on the function of knee in patients with osteoartritis (OA) by using pilates exercises or clinical-based physical therapy.
Methods: Thirty-four females with bilateral knee OA (Altman Grade II) were sequentially divided into 2 random groups (GI to GII). The patients in group I received pilates exercise (45 min) and group II received clinical-based physical therapy included in neuromuscular electrical stimulation (30 min) and isometric exercise program (20 min) 5 times weekly for 4 weeks. The mean age and body mass index (BMI) of the patients in GI were 50±6.21and 28.06±5.06 and in GII were 53.26±8.9 and 28.52±5.13. All patients were given a booklet describing weight loss practices and low-energy diet. The changes of body weight and body composition were measured with TBF-300M (TANITA Corp.). Symptoms were monitored by the Western Ontario and McMaster Universities' (WOMAC) OA index.
Results: The pilates and clinical-based physical therapy weight reduction were 2.27% and 1.58%, respectively ($p<0.05$), with a mean difference being 1.92% (1.59 to 2.5%). The decrease of body fat percent was higher in the pilates group, 5.5% (4.1 to 8.84%; $P<0.05$). The total WOMAC index improved in both group, mean difference; in GI 76,8±27,7 and in GII 85,2±24,5, changes in total WOMAC index were best predicted by the reduction of body fat percent, with a 59.09% (46.9 to 108.8%) improvement in WOMAC index.
Conclusions: In our patients with knee OA, a weight reduction of 1.92% improved function by 59%. Pilates might be of advantage to control weight because of the rapidity of weight loss and a more significant loss of body fat. As the patients show a corresponding reduction in their risk of other health problems as well, weight loss is proposed as a first-choice therapy for knee OA.

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METABOLIC ASPECTS OF THE RHEUMATIC DISEASES

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Introduction: From the positions of cardiology and endocrinology the urgency of metabolic syndrome (MS) isn't doubtful today and reflects the epoch of the epidemics of diabetes mellitus, obesity, arterial hypertension and ischemic heart disease. The prevalence of rheumatic diseases is considered not to be less, however the metabolic aspects of rheumatic diseases are not understood.
Aim of the study: to study the special features of metabolic disturbances in rheumatic patients.
Methods: From these positions 512 cases of osteoarthritis (OA), 748 – of rheumatoid arthritis (RA), 62 - gout (G), 58 - system lupus erythematosus (SLE), 31 - system scleroderma (SSD), 69 - the rheumatic heart disease (RHD), totally 1546 patients with the rheumatic diseases have been studied. Weight body index, age, metabolic electrocardiogram's changes, dyslipidemia, the level of glycemia, the disturbances of hemostasis and other metabolic parameters were investigated and compared with rheumatic diseases.
Results: The greatest frequency and gravity of metabolic disturbances is revealed with G and OA: 62 (100%) and 308 (60,2%) respectively. In these cases a maximum quantity - 5 and more than components of MS – was determined in 51 (82,3%) with G and 52(16,9%) with OA. Obesity, arterial hypertension, hypercholesterolemia, the disturbance of carbohydrate and purine metabolism were characteristic. With the RA and RHD - MS it was possible to reveal in 201 (26,9%) and 19 (27,5%) respectively. Arterial hypertension, dyslipidemia, ischemic heart disease prevailed but were encountered in the more late age groups. MS in SLE was determined in 21 (36,2%), in SSD - 8 (25,8%). The leading components were arterial hypertension, obesity, hypercholesterolemia and the disturbance of carbohydrate metabolism.
Conclusion: In patients with different rheumatic diseases metabolic parameters were different in the frequency of occurrence and constituents. This investigation makes it possible to note a wide spectrum and the highest frequency of metabolic disturbances in gout and osteoarthritis. Considerably rarer and the less expressed manifestations of MS were determined in patients with rheumatoid arthritis, system lupus erythematosus, system scleroderma and the rheumatic heart disease.

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COMBINING DIETARY MODIFICATION WITH AN EXERCISE INTERVENTION IMPROVES RANGE OF MOTION AND REDUCES KNEE PAIN ASSOCIATED WITH OSTEOARTHRITIS

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Aim of Study: To investigate whether the combined effects of dietary modification with an exercise regimen in comparison to dietary modification alone is more beneficial in improving range of motion and reducing symptoms of knee pain associated with osteoarthritis (OA).
Methods: A total of 63 men and women (age 45-69) with diagnosed OA or with self-reported knee pain associated with OA that was not attributed to injury or rheumatoid arthritis were recruited. Study participants in both groups were counseled to modify diet with a focus on decreasing fat and sugar intake, increasing vitamin and mineral intake, and increasing fluid intake. Subjects in the combined dietary and exercise treatment group were counseled to incorporate an at-home exercise program designed specifically for improving joint function and mobility. During the three-month treatment period, subject compliance was monitored through follow-up phone calls and a calendar on which subjects were asked to record diet and exercise. All study participants completed a medical history questionnaire at baseline. Anthropometric measurements such as height, body weight, and body composition were obtained at baseline and at the end of the treatment period. Range of motion (sum of active flexion and extension) for both knees was assessed at baseline and end of study